

**A Plan for the
National Center
for Research
Resources:
1998–2003**

National
Institutes of
Health

NCRR
A Catalyst for Discovery



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National Center for Research Resources
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National Institutes of Health

National Center for Research Resources
National Institutes of Health
Bethesda, MD
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Acknowledgment

To the Biomedical Research Community:

The NCRR wishes to acknowledge the invaluable support and cooperation that hundreds of members of the biomedical research community across the Nation provided to this dynamic planning effort. With your help we have been able to update our earlier plan and continue to be responsive to research needs identified with the scientific community.

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Introduction

NCRR's Mission: To serve as a "catalyst for discovery" for NIH-supported investigations throughout the Nation.

The National Center for Research Resources (NCRR) creates, develops, and provides a comprehensive range of human, animal, technological, and other resources to enable biomedical research advances. NCRR promotes collaborations within and across scientific disciplines and provides quick, flexible approaches to new and emerging research needs.

The fulfillment of this mission, in alliance with our NIH partners, will provide the research tools and resources to attain better health for our Nation's citizens.

The National Center for Research Resources occupies a unique niche as a component of the National Institutes of Health (NIH). Unlike the 18 categorical institutes of NIH, each focused on a particular disease, organ system, or line of research, NCRR is charged with the task of providing the critical research resources and research tools that underpin all areas of scientific inquiry supported by NIH.

This trans-NIH mandate is a formidable task. To plan future directions, NCRR must track cutting-edge advances and identify emerging trends in biomedical areas, ranging from molecular biology and comparative medicine to clinical research. NCRR accomplishes this task by seeking the assistance of the biomedical research community. Comments and recommendations of hundreds of investigators from across the country helped NCRR create and publish its first strategic plan in 1994, which has since guided its activities and funding priorities.

Now, four years later, NCRR is pleased to report that approximately 90 percent of the objectives set forth in that first strategic plan have been successfully accomplished. As recommended, NCRR established three national gene vector laboratories in cooperation with several other components of NIH; expanded the range of services and technologies provided by the General Clinical Research Centers; expanded support of innov-

ative and high-risk technologies; helped launch a new national resource for transgenic mice and rats; expanded the Shared Instrumentation Grant Program; tripled funding for construction of research facilities; and facilitated communication with the scientific community through the NCRR Web site.

With these and other objectives met, NCRR initiated a second open, interactive strategic planning forum in late 1997 to set new goals and objectives that will bring NCRR into the next millennium. Other workshops provided additional input for several NCRR areas. The document presented here updates the original strategic plan and represents the culmination of considerable input and recommendations received from a broad cross section of the biomedical research community.

More than 370 respondents to the 1997 Strategic Planning Survey, including scholarly societies, identified emerging scientific trends and critical research resources and technologies essential for creating a robust environment for biomedical research. (See "Trends and Challenges in Biomedical Research" on pages 3-5.) Input from this survey then served as a framework for discussions at NCRR's Fall 1997 Scientific Planning Forum held in Herndon, Virginia, where 65 distinguished members of the biomedical research community generated a set of recommenda-

tions that contributed to this updated strategic plan. As recommended in the 1994 plan, NCRR will continue to give priority to those resources and projects for which it is the best or only source of support. To help NCRR make difficult funding decisions, participants in the 1997 Scientific Planning Forum encouraged NCRR to use the following criteria for priority setting when supporting research resources and technologies:

- At the cutting-edge of innovation in technologies and research, including high-risk and long-term research that may have significant societal payoff.
- Cost-saving, efficient, shared, and accessible.
- Responsive to unexpected opportunities and the ever-changing resource needs.
- One-of-a-kind, scarce, and/or expensive.
- Multidisciplinary and collaborative, often serving to integrate diverse research efforts.

This updated strategic plan once again reflects the vision and ideas of the biomedical research community, and it strongly supports the mission of NCRR. This collaborative effort of a federal institution and its scientific constituency will not only provide better resources and research tools for essential biomedical research endeavors, but will ultimately help to improve the health and productivity of all Americans.

Trends and Challenges in Biomedical Research

Biomedical science is advancing at a breathtaking speed. Only a decade ago AIDS was untreatable, the feasibility of the Human Genome Project was hotly debated, and an estimated five million Americans with peptic ulcers were typically treated with antacids that provided only temporary relief. Today, however, a new class of drugs can postpone symptom development in AIDS; the Human Genome Project offers unprecedented insights into the nature of genetic diseases; and new antibiotic therapies have the potential to cure about 90 percent of ulcer patients. Such scientific progress promises the American people new opportunities for living longer, healthier, and more productive lives. Each of these advances depended in part on NCRR support of critical research technologies and access by researchers to shared resources. Hence, the challenge to NCRR is to provide an array of resources and technologies, as well as career development and training opportunities to drive and sustain this momentum.

Although many scientific breakthroughs are unforeseeable, anticipating such advances—and the requisite tools for their achievement—is at the heart of NCRR's mission. By remaining flexible and responsive to the ever-changing needs of biomedical researchers, NCRR strives to provide the crucial tools, technologies, and research resources that will allow scientists to achieve the biomedical breakthroughs of tomorrow.

This 1998–2003 Plan, *NCRR: A Catalyst for Discovery*, has been developed in partnership with biomedical investigators from across the country. To obtain the widest possible scientific input, NCRR placed a notice in the *Federal Register* asking scientists to identify and comment on the basic and clinical research trends expected to drive future needs for resources and technologies. Their responses reveal some of the common expectations and concerns of a diverse cross section of the biomedical research community.

This invaluable input guided the format of an NCRR Scientific Planning Forum titled “Choices and Challenges: Future Directions for NCRR,” held in September 1997. Additional workshops and panels addressed clinical, animal, and neuroscience research tools and resource needs. Members of the scientific community further discussed critical research trends,

current and anticipated resource needs, and other pressing concerns. The forum and workshop participants proposed new opportunities and actions that are set forth in this document.

Many of the trends identified by both survey respondents and forum participants were extensions of those elaborated in NCRR's 1994 strategic plan. In brief, respondents noted the following dominant trends in biomedical science:

- A move toward interdisciplinary research.
- An increased reliance on and need for bioinformatics.
- An increasing emphasis on molecular genetics and medicine.
- A greater need for specialized biological models.
- Rapid advances in imaging techniques.
- A growing need for career development and specialized training programs for clinical, biomedical technology, and animal-based research.

Some of the observations and ideas NCRR received — distilled from the many voices of the scientific community — are presented below.

Interdisciplinary Research

Biomedical research is increasingly an interdisciplinary effort, as scientists seek to understand the entirety of biomedical problems and issues. As technology advances, some branches of biomedical science are becoming highly specialized, allowing researchers to delve more deeply into biological problems and answer questions in exquisite detail. This trend toward specialization also offers exciting new opportunities for interdisciplinary collaborations. The changing demands of today's research environment require greater cooperation among biomedical scientists as boundaries dividing some disciplines disappear or are being redrawn.

NCRR, because of its trans-NIH nature, is uniquely positioned to help scientists transcend barriers to interdisciplinary research and move discoveries from bench to bedside. Shared research resources and instrumentation help provide a fertile research environment for interdisciplinary studies and the sharing of expertise.

Bioinformatics

As the acquisition and availability of scientific data continue to escalate, the demand for improved bioinformatics, computer modeling, analytical tools, and remote access to research resources will necessarily increase as well. Biomedical scientists are seeing the impact of an information explosion. As a wealth of scientific information is collected and stored in ever-larger databases, institutions and investigators must be able to quickly access that information and use it effectively. Accumulation of data without access and tools to analyze it would be meaningless.

The ubiquity of the Internet has forever changed scientists' abilities to access and manipulate critical data and information. From biomedical imaging to molecular genetics and structural biology, an increasing number of scientific disciplines depend on sophisticated computers and associated software and algorithms to render unwieldy data accessible. Immense streams of biomolecular, chemical, imaging, and other data require increasingly sophisticated tools for their capture, display, visualization, and analysis.

NCRR currently supports many critical computational resources — including centers for high-performance computing and communications — that enable access to essential computing tools and scientific data.

Molecular Genetics and Medicine

Advances in molecular genetics and medicine have already demonstrated that the structures of individual genes and proteins provide new starting points for diagnostics and therapies to identify and correct defects in the regulation of the body's cellular machinery and organ systems. These advances will drive the next wave of molecular medicine.

The assembly of genomic databases, although a magnificent accomplishment, is only the first step in reaping the rewards of the genome projects. The next step will be the "postgenomic era," known variously as "functional genomics," "post-translational

research," or "proteome research." Whatever its label, as we approach the next millennium, biologists are gradually expanding their focus from the discovery and mapping of single genes to functional studies of their protein products and the concurring activities of multiple genes or proteins.

This shift will require increasingly precise analytical tools and technologies, specialized clinical and basic research facilities, and the study of nonhuman biological systems. Because such state-of-the-art resources can be prohibitively expensive, and advanced technologies often require assistance from experts trained in their use, the shared research resources and instrumentation supported by NCRR are expected to play a prominent role in these exciting new investigations.

Biological Models

Nonhuman models for human biology are gaining in importance. Growth in such areas as immunology, cloning, transgenics, transplantation, and vaccine development depends on biological models. NCRR has long recognized that studies of animals and other biological models are critical for understanding and ultimately improving human health. Often, research models enable scientists to examine complex biomedical problems in less complex systems.

New genetic tools and technologies are further enhancing the usefulness and relevance of nonhuman models. As researchers become increasingly able to manipulate the genome, specialized tissues and organisms are being produced to help answer vexing biological questions.

Even when the effect of a particular mutation has not yet been pinpointed, or the value of a mutant organism is uncertain, a unique animal model may hold the key to a future biomedical problem. However, there is a price to pay for this bounty of genetic treasures: scientists must now scramble to find economic and effective techniques for storing and sharing hundreds of thousands of new strains of animals and other models.

NCRR has a history of ensuring access to unique and essential models for biological processes and human disease. Addressing the growing need for preserving valuable mutants and other critical biological models will continue to be a priority.

Imaging Technologies

A complete understanding of human health and disease requires the capacity to image at all levels of organization: from the organism to organ systems, tissues, cells, organelles, and macromolecular components. Imaging technologies — especially noninvasive techniques — are evolving rapidly and opening new horizons in areas ranging from basic to clinical research. New, more sensitive imaging techniques offer an unprecedented look at the functions of the human brain and heart. Advanced microscopy techniques allow visual access to the interior of living cells. And new methods in x-ray crystallography can help produce “molecular movies” of rapid chemical reactions. New imaging techniques also offer the possibility of improving the safety and accuracy of clinical diagnostics.

Because advancement and use of imaging tools often require extensive and expensive instrumentation, equipment, and facilities, NCRR plays a special role in supporting shared resources and technology development. In this way, NCRR ensures the availability of and access to these critical research instruments.

Career Development

The strength of our Nation's biomedical community depends on a continuous stream of superbly trained scientists. The United States would suffer without a well-trained corps of biomedical researchers standing ready to address critical health-related problems. Since its inception, NCRR has used a variety of funding mechanisms to support training, education, and career development for biomedical scientists in a broad range of disciplines.

Training and career development programs in clinical research and comparative medicine provide essential on-the-job instruction to researchers, especially the young, who hope one day to become independent investigators. At NCRR's biomedical technology resource centers, training workshops help scientists better understand the use and potential applications of state-of-the-art instruments and technologies. At the same time, NCRR has strengthened the research base and supported career development at minority institutions and in geographic areas that receive little NIH funding. Moreover, science education increases students' and their teachers' understanding of biomedical science and improves the public's science literacy.

The Plan

The plan set forth in the following pages is intended to be adaptable and responsive to the changing needs of biomedical researchers. Clinical research, critical technologies, research models, and research infrastructure are essential resources for addressing the trends described above. It is now NCRR's challenge to respond to these varied and critical research needs by capitalizing on the opportunities presented in this dynamic document. This updated strategic plan provides a snapshot at a single moment in time during the process; strategic planning is a dynamic, evolving process that assists NCRR in setting directions and priorities to support development of research tools and shared resources to facilitate a broad array of health research.

Objectives and Plans

Clinical Research

Ensure that the clinical research community has sufficient research resources and technologies to rapidly and effectively respond to current and emerging critical health issues.

Critical Technologies

Promote the development of and accessibility to novel and essential research tools and support cutting-edge technologies.

Research Models

Promote the development, availability, accessibility, and preservation of animal and nonanimal models for health-related research.

Research Infrastructure

Improve and maintain the Nation's biomedical research infrastructure.

Career Development

Ensure the growth and strength of the Nation's scientific talent base.

Strategic Alliances and Access Issues

Pursue strategic alliances with the institutes and centers of NIH, other federal organizations, academia, industry, and other interested groups to enable access to essential biomedical research resources.

Communication

Inform the biomedical research community and the public about research and resource opportunities and scientific advances.

Management and Operations

Ensure that the administrative components of NCRR remain responsive to the needs of the scientific community.

Clinical Research

Objective: Ensure that the clinical research community has sufficient research resources and technologies to rapidly and effectively respond to current and emerging critical health issues.

The health of our Nation's citizens depends on vigorous clinical research teams that evaluate and address emerging medical problems. Through its General Clinical Research Centers (GCRCs) and National Gene Vector Laboratories (NGVLs), NCRR catalyzes the transfer of technologies from the laboratory bench to the patient. NCRR must remain flexible and responsive to changing and future research needs.

Plan:

New or Expanded Opportunities

- ***Expand the role of GCRCs as a major institutional focus for clinical research*** to facilitate clinical research across all disciplines. A focused, institutional approach is imperative.
- ***Increase the number of investigators who pursue careers in clinical research.*** Provide focused career development opportunities for clinical investigators. Modify programs to provide career development at an earlier stage of investigators' careers. Consider loan forgiveness programs and redesigned clinical career development activities.
- ***Improve the quality of patient-oriented research and clinical investigators.*** Encourage collaborations with basic scientists, and increase the basic research skills of clinical investigators to help them translate scientific knowledge into effective patient care. Provide translational, didactic courses to enhance the knowledge of all clinical investigators.
- ***Establish GCRC-based referral networks for rare diseases.*** Develop partnerships with orphan disease organizations to provide referral networks and data management resources across GCRCs.
- ***Encourage the development of genetic techniques for clinical research.*** As the genome project and genetic research move toward clinical research, more noninvasive diagnostic techniques need to be developed. Expand the role of NGVLs for developing gene vectors for human therapy.
- ***Extend access to GCRC resources at host institutions.*** Expand and integrate the Computerized Database Management and Analysis Systems (CDMAS), biostatistics, databases, and other software to support clinical research and epidemiologic studies.
- ***Poise GCRCs to meet challenges created by emerging discoveries in genetic medicine and translational research.*** Encourage collaborations and pooling of data and patients for genotype/phenotype studies by cross-training basic and clinical scientists.
- ***Enhance the venue for GCRC-based research.*** Expand support for clinical research activities for research in intensive care units, emergency rooms, and other comparable sites.
- ***Establish regional core laboratory hubs specialized in the latest molecular technologies that will facilitate collaboration.*** As the genome project identifies more genes that cause or contribute to disease, shared laboratories, strategically located across the country, can greatly facilitate clinical research.

Critical Technologies

Objective: Promote the development of and accessibility to novel and essential research tools and support cutting-edge technologies.

Advances in science and technology occur with breathtaking speed. Breakthroughs in other disciplines such as physics can have important implications for research tools for the study of biology or medicine, but first these discoveries or inventions must be adapted for use in the health-related sciences. NCRR recognizes that high-quality and innovative biomedical research depends on the availability of state-of-the-art technologies and research facilities.

Plan:

New or Expanded Opportunities

► ***Encourage the development of quantitative, integrative, and mathematical models*** to reduce the complexity of the information emerging from genomics. Demonstrate the feasibility and utility of technologies for physiological phenotyping, develop approaches to drug design, and genomic and pharmacological intervention.

► ***Enhance research and service support of synchrotrons.*** Increase the technical assistance staff for optimal operation and user support. Upgrade instrumentation to increase efficiency. Assess need for additional beam lines to accommodate genomic revolution.

► ***Increase the support for bioinformatics*** through resources that develop data mining tools and strategies to integrate the information into meaningful schema. Improve databases, computer modeling, and evolution from databases to knowledge bases. Develop data visualization and retrieval tools.

► ***Expand analytical and computational aspects of Biomedical Technology Resource Centers.*** Enhance computing and network infrastructure for technologies, including NMR microscopy and high energy X-ray. Encourage multidisciplinary collaborative research that integrates use of World Wide Web database networks to enhance access to technologies, supercomputers, and modeling tools.

► ***Expand protein, cell, and tissue engineering resources.*** These are essential to facilitate research in all areas of health research.

► ***Expand Shared Instrumentation Grant program.*** Research tools are critical to fully explore the genome and discern the genetic and molecular basis of health and disease.

► ***Develop innovative or enhance existing technologies or methodologies that can meet the special needs of NIH categorical institutes.*** Novel research tools are essential for exploring uncharted research areas.

Research Models

Objective: Promote the development, availability, accessibility, and preservation of animal and nonanimal models for health-related research.

Much of our understanding of the human body in health and disease is based on basic and applied research performed with animal and nonanimal models. Using these models to study human disease, researchers can conduct crucial experiments that would otherwise be impossible. NCRR lends strength to the Nation's biomedical research community by supporting a broad range of model systems, including vertebrate, invertebrate, cellular, mathematical, and computer models.

Plan:

New or Expanded Opportunities

- ***Develop better techniques for cryopreservation*** of biological specimens, including embryos, sperm, and ova of all species. Preserving these resources reduces costs and space requirements. Safeguard cryopreserved materials by developing appropriate storage facilities or resources. Determine criteria and set priorities for storing biomaterials and for monitoring the contents of cryopreservation facilities so that materials that are no longer needed can be purged.
- ***Disseminate information about available model systems.*** Host conferences or workshops on the benefits and limitations of existing model systems and the need for future biological models.
- ***Foster translational research between comparative medicine and clinical research.*** Encourage more interaction and collaboration between clinicians and basic comparative medicine scientists to create mutual respect and understanding of medical applications between the two groups. Enhance model development to ensure vectors for gene therapy, vaccine development for HIV, and models to study degenerative brain disorders.
- ***Provide institutional support for the development and maintenance of research models.*** Whole animal models are critical to functional genomics but generate extremely high per diem animal costs that cannot be readily supported by research project grants.
- ***Miniaturize imaging and other technologies.*** Use of these tools is critical to identify gene-induced developmental defects.
- ***Improve and expand research space at Regional Primate Research Centers (RPRCs)*** to accommodate more outside scientists. Ensure optimal access to research animals by developing program-wide guidelines on proposal review and access.
- ***Expand national shared resources for induced mutants for an enriched variety of models.*** Resource sharing is cost-effective and better utilizes investigators' time. With the zebrafish, mouse, and rat genome efforts, national resource sharing is essential.
- ***Establish national research hubs with regional satellites to provide research expertise and technologies*** for research models. These hubs will provide local and virtual access to models.
- ***Create a national network of comparative medicine and integrative biology expertise*** to support animal models for NIH research, such as phenotypic assessment, disease diagnostics, and interdisciplinary–multidisciplinary interaction.

Research Infrastructure

Objective: Improve and maintain the Nation's biomedical research infrastructure.

Advances in biomedical science depend on the availability of stable, well-maintained, state-of-the-art research environments. At their best, such environments not only include novel research tools and technologies but also facilitate collaboration among scientists and sharing of expertise. NCRR supports research infrastructure at minority institutions, increases competitiveness at institutions from states with limited NIH support, funds construction and renovation at research institutions around the country, and improves science education and the public's understanding of science.

Plan:

New or Expanded Opportunities

► ***Increase access to major institutional resources,*** gene transfer technologies, molecular biological techniques, and computer information technologies.

► ***Strengthen the clinical research component of the Research Centers in Minority Institutions (RCMI) program*** by providing support for faculty development, along with training resources for information technology and biostatistical support.

► ***Re-evaluate the role of the Biomedical Research Support Grants (BRSR) Program.*** The BRSR Program could be an effective program if it includes rigorous peer review at the institutional level as well as retrospective review at the NIH level. BRSRs could provide bridge funding for established investigators and start-up funding for new investigators. Discretionary funds for this purpose at academic sites have become progressively more limited.

► ***Enhance capacity for mathematical modeling*** to analyze and design experiments to provide systemic integration of data.

► ***Address bioinformatics needs that transcend all disciplines.*** Develop standards and data retrieval and manipulation tools. The rate of data accumulation exceeds the capacity of investigators to carefully analyze and visualize data.

► ***Increase support for construction and major renovation of research facilities.*** Adequate physical resources, particularly specially adapted animal facilities, are essential for researchers to continue to meet challenges posed by expanding scientific knowledge and follow-on studies of the genome project.

► ***Expand mentorship programs for new biomedical researchers,*** especially for those from disadvantaged backgrounds.

► ***Enhance student and public science literacy.*** Assess effectiveness of current programs and modify to improve effectiveness, especially for disadvantaged populations.

Career Development

Objective: Ensure the growth and strength of the Nation's scientific talent base.

Lofty goals for biomedical research mean nothing without a vigorous, diverse, and continuously renewed corps of well-trained investigators. NCRR gives high priority to strengthening the Nation's human resources in science. Future generations must be assured of an adequate workforce of biomedical and clinical researchers to ensure the health of our Nation's citizens.

Plan:

New or Expanded Opportunities

- ***Develop a training program for basic molecular biology*** with existing resources serving as centralized “hubs” to foster cross-fertilization between disciplines and bridge gaps. Teach basic scientists (not just MDs) patient-oriented research.
- ***Develop study groups, conferences, and training materials*** to establish a set of principles that focus on integrative biology, especially for cross-disciplinary activities and training.
- ***Provide support for training grants in informatics***, especially bioinformatics. Bioinformatics is essential to biology and computationally intensive science, which is being driven by molecular genetics.
- ***Provide support for student and investigator training*** in laboratory animal genetic engineering and colony management.
- ***Develop post-Clinical Associate Physician mid-career awards*** to continue the career trajectory of clinical investigators.
- ***Modify existing clinical research career development mechanisms*** to increase the scope and length of support. Promote GCRCs as institutional multidisciplinary clinical research training resources. Special strategies are needed to attract and sustain clinical investigators, given the sophisticated technologies and complexities of clinical research.
- ***Modify existing programs to provide up to five years of clinical research career development***, starting earlier in an investigator's career. Assure that candidates are carefully mentored and that they learn to use the tools of clinical research effectively.
- ***Enhance cross-training and career development opportunities for veterinarians***. Animal-based research is a key component to examining the genome. Partnerships between veterinarians and other scientists are essential.

Strategic Alliances and Access Issues

Objective: Pursue strategic alliances with the institutes and centers of NIH, other federal organizations, academia, industry, and other interested groups to enable access to essential biomedical research resources.

In today's climate of financial constraints and limited resources, it is imperative that organizations with similar interests join forces to foster scientific progress. Greater advances are achieved when groups work in concert rather than pursuing separate paths toward the same end. NCRR will continue in this capacity, actively exploring opportunities for forming partnerships with other organizations, including those in the private sector, to support and energize the scientific community. These alliances will enrich and enlarge the pool of investigators accessing NCRR resources.

Plan:

New or Expanded Opportunities

► ***Foster access to resources*** by developing a formal mechanism to fund long-term collaborations and ways to attract visiting researchers to travel to resource centers. Encourage fair competition for access to resources based on quality of science, innovation, and need. Develop guidelines on resource center access and proposal review. Encourage NIH funding to support access and promote the importance of resources.

► ***Stimulate interactions between resource centers.*** Encourage the directors of the NCRR resource centers to promote the exchange of ideas and be proactive in increasing awareness of the resources and research opportunities available at these centers.

► ***Foster more collaborative coalitions for cost-sharing*** by providing program support jointly with other institutes and centers of NIH. Encourage more liaisons and partnerships between the physical and computational sciences.

► ***Continue collaborations with other government organizations,*** including the Department of Energy, the National Science Foundation, and others. Further develop opportunities that mutually benefit the research missions of many federal agencies.

► ***Emphasize activities that are unique to NCRR.*** Avoid duplicating resources that the private sector or other NIH components already offer and manage well.

Communication

Objective: Inform the biomedical research community and the public about research and resource opportunities and scientific advances.

The interdisciplinary nature of NCRR's mission uniquely positions it to develop and disseminate research and resource information to a broad audience.

Plan:

New or Expanded Opportunities

➤ ***Increase awareness and knowledge of multi-disciplinary activities across NCRR-supported research resources*** through electronic dissemination of information or other activities, such as holding an annual meeting of all NCRR-supported research resource directors.

➤ ***Develop outreach activities to improve visibility of resources at host institutions.*** Communicate with host institutions to generate interest in jointly organized initiatives that would promote NCRR-supported research resources. Publicize accomplishments of NCRR programs among researchers, physicians, Congress, and the public.

➤ ***Develop a variety of information sources and products*** to broaden awareness of NCRR resources and capabilities, and to promote accessibility. Consider the development of a "traveling" exhibit describing research resource centers for use at professional meetings and other events.

➤ ***Enhance and expand current online information networks*** to promote collaborations among biomedical investigators and access to NCRR-supported resources. Enhance the NCRR Web site and links to other sites.

➤ ***Emphasize the importance of acknowledging research support when publishing scientific advances.*** Use a variety of NIH-wide and DHHS mechanisms and other communication channels to emphasize the importance of identifying federal support of biomedical research for national goal setting and future planning.

➤ ***Improve contents of current NCRR print publications and the effectiveness of dissemination.*** Use systematic marketing techniques to target potential resource users in the biomedical research community.

Management and Operations

Objective: Ensure that the administrative components of NCRR remain responsive to the needs of the scientific community.

By providing appropriate programs, funding mechanisms, and overall guidance, the programmatic components of NCRR strive to empower biomedical investigators. Although some of NCRR's programs and activities are congressionally mandated, NCRR can exercise considerable latitude in carrying out those functions. NCRR staff aspire to provide superior service to the biomedical community and continuously evaluate options for improving management and operations.

Plan:

New or Expanded Opportunities

► ***Foster cutting-edge research proactively.***

Use symposia, workshops, and peer review to determine how to promote cutting-edge research and respond to emerging research trends, such as gene therapy and bioinformatics. Continue and expand the innovative research grant program.

Explore such areas as genomic intervention, physiological phenotyping, orthogonal vectors, sensor chip technology, inexpensive and minimally invasive imaging, and confocal microscopy.

► ***Maintain proper program balance*** between emerging versus established technologies, technology development versus service support, and resource centers versus research project grants.

► ***Evaluate ongoing NCRR-supported programs***

to measure their value and accessibility by the extra-mural community. Conduct systematic ongoing reviews of existing programs to detect trends affecting resource allocation.

► ***Ensure appropriate peer review.*** Reassess the adequacy of peer review and preserve site visits for complex centers. Maintain appropriate peer review mechanisms for innovative and multidisciplinary resource applications.

► ***Revise and streamline the current grant applications and annual progress reports.***

Simplify the burdensome, costly, and complex process of applications and annual progress reports. Automate processes electronically, where feasible.

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Years in parentheses indicate when terms expire.

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"Choices and Challenges: Future Directions for NCRR" September 10-11, 1997

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"Choices and Challenges: Future Directions for NCRR" September 10–11, 1997 (Continued)

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"Choices and Challenges: Future Directions for NCRR" September 10–11, 1997 (Continued)

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